

KOBOZEV, N. I.

Dankov, Pavel Davydovich, d. 1952

P. D. Dankov (obituary). Zhur.fiz khim. 26, No.2 1952.

Monthly List of Russian Accessions, Library of Congress, September 1952. UNCLASSIFIED.

KOBOZEV, N.I.

USSR/Chemistry- Catalysts

May 52

"Active Centers and Mechanism of the Oxidation of Sulfur Dioxide," V. I. Shekhalova, I. V. Krylova, N.I. Kobozev, Moscow State U imeni M. V. Lomonosov.

"Zhur Fiz Khim" Vol XXVI, No 5, pp 703-718

The elementary centers of the oxidation of sulfur-dioxide are the monoatomic ensembles Pt₁ and Pd₁, no matter what the chem nature of the catalyzing metal (i.e., Pt, Pd) and the carrier may be. The activity of the monoatomic Pt ensemble does not depend very strongly on the nature of the carrier. The observed dependence of activity on the deg of filling of the carrier's surface is in accordance with the eqs of the theory of active ensembles. The carrier may affect activity by its geometric structure and its inhomogeneity of surface. The latter effect is apparent only when there is a high diln of the catalyst layer on the surface. The fact that single Pt and Pd atoms are active proves the purely oxidative character of the process, and refutes Wieland's dehydrogenation theory (i.e., hydration of sulfur dioxide followed by dehydration), because the action of diatomic ensembles is required by this theory.

21979

KOBOTSEV, N. I.

"Magnetochemistry of Active Centers: I. Magnetic and Catalytic Properties of Dilute Films," N.I.Kobozev, V.B.Yevdokimov, I.A. Zubovich, and A.H.Mal'tsev, Moscow State U., Zhur Fiz Khim, Vol 26, No 9, pp 1349-1373, Sep 52.

Investigated magnetic and catalytic properties of dil films of Pt, Ag, and other paramagnetics on various carriers as a function of the degree of filling of the surface. Found that all these paramagnetics on all carriers (Pt/silica gel, Fe/carbon, $\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$ /silica gel, $\text{Ni}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$ /carbon, Ag_1 /carbon, $\text{Ag}_1/\text{BaSO}_4$, $\text{Ag}_1/\text{BaCO}_3$) show an abnormally high paramagnetism ("superparamagnetism") in dil films equal to several times 10 Bohr magnetons per atom. Ascribe this paramagnetism to a change in the statistics of the Langevin "paramagnetic gas" in adsorption films. Found that Fe on C in respect to magnetism behaves analogously to paramagnetic Pt. This, acc to the authors, demonstrates the purely paramagnetic, i.e., atomic and not cryst character of these films. Also studied the susceptibility of dil films of a normally diamagnetic metal, Ag, on C, BaSO_4 , establishing emergence of a paramagnetic form of Ag, which passes through a max with increasing density of the film. In films of high concn, Ag is diamagnetic. This indicates the formation of atomic ensembles of Ag. The paramagnetic form of Ag in films also exhibits "superparamagnetism". In the catalytic hydrogenation of ethylene on dil films of Pt, authors established clear parallelism bet paramagnetism and hydrogenation activity. This was also true of the catalytic activity of Ag. Catalytic activity did not depend on the magnetic properties of the carriers.

261739

2. USSR (600)

4. Chemists

7. A. V. Frost (Obituary). Zhur. fiz. khim. 26, No. 10, 1952.

9. Monthly List of Russian Accessions. Library of Congress. March, 1953. Unclassified

1. RUZICZKY, H. I.; POLICHAK, G. M.

2. USSR (600)

4. Chemical Structure

7. Thermodynamics of "ensembles" and theoretical basis for entropy regularities.
Part 1. Application to chemical processes. Zhur. fiz. khim. 26, No. 10, 1952.

9. Monthly List of Russian Accessions. Library of Congress. March, 1953. Unclassified

USSR/Chemistry - Catalysts

Nov 52

"The Catalytic Oxidation of SO_2 : II. The Kinetics of the Oxidation of SO_2 in the Region of Atomic and Crystalline Films of Platinum and Palladium," V. I. Shakhobalova, I. V. Krylova and N. I. Kobozev, Moscow State U

"Zhur Fiz Khim" Vol 26, No 11, pp 1666-1672

The authors identified the active centers of Pt metal catalysts, during the oxidation of SO_2 , beginning with very thin X-ray-amorphous films of Pt on silicagel, and ending with clearly cryst catalysts. As characteristic properties, they singled out the specific form of the kinetic law of SO_2 oxidation and the magnitude of the energy of activation. They detd that the peculiar form of the kinetic law discovered for the catalytic oxidation of SO_2 on Pt wire remains accurate for the thinnest Pt films on silicagel; also, that the oxidation of SO_2 on Pd is also subject to this law. This was confirmed by the identical structure of the active centers of (Pt₁) and (Pd₁). They detd that the energy of activation of SO_2 oxidation on Pt is const, beginning with very thin films of Pt on silicagel and ending with the cryst catalyst; this energy was equal to 19,000 small calories. On Pd the energy of activation was equal to 27,000 small calories. To the authors, all the above demonstrated the identity of active centers in amorphous (atomic) and cryst catalysts. In this case, the elemental active center is the single atom Pt₁ or Pd₁, fixed by the surface of the carrier, whether silicagel or cryst Pt. The authors conclude that the crystal phase of Pt has no practical effect on the character of the active centers, and therefore plays no determining role in the catalytic process.

PA 242T15

(CA 47 no.13: 6234 '13)

USSR/Chemistry - Iron-Carbon Catalysts

May 53

"Concerning the Magnetic Properties and Structure of Iron-Carbon Catalysts,"
M.I. Temkin and S.L. Kiperman

Zhur Fiz Khim, Vol 27, No 5, pp 753-760

The authors subject to criticism the theory of active "ensemble" set forth by V. B. Yevdokimov, I.N. Oseretkovskiy and M.I. Kobozov. They state that the work of Kobozov et al actually confirms their own conclusion, to wit, the Fe on C is found in the form of small crystals which are spontaneously magnetized under the influence of the molecular field. The authors reject the assertion of Kobozov et al the Fe on C is found in an atomic, non-crystal-line state.

Kobozev, N. I.

Comments on "Surface measurements on planarized
silica gel" by G. K. Borekova and A. P. Karmenichov.
N. I. Kobozev (M. V. Lomonosov State Univ., Moscow).
Zhur. Fiz. Khim. 37, 701-4 (1963). - Kobozev takes issue

with the interpretation of data by Borekova and Karmenichov (C.A. 47, 5759g) in detg the surface of a metal on a
carrier. Kobozev contends that H₂ and K₂ data point
to significant atomization of the Pt in thin layers
/ R. D. Lench

"APPROVED FOR RELEASE: 09/18/2001

CIA-RDP86-00513R000723410015-8

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APPROVED FOR RELEASE: 09/18/2001

CIA-RDP86-00513R000723410015-8"

USSR/Chemistry

Card 1/1

Authors : Lunina, M. A., and Kobozov, N. I.

Title : Study of the Catalytic Mechanism of Oxide Polymerization.

Periodical : Zhur. Fiz. Khim. Vol. 28, Ed. 4, 745-751, Apr 1954

Abstract : Experiment on the oxide polymerization of linseed oil by means of stearate catalyzers (Co, Pb, Fe), and the analysis of activities of benzoyl peroxide, and Al_2O_3 during polymerization process. Five references; graphs.

Institution : M. V. Lomonosov's Moscow State University and D. I. Mendeleev's Chemico-Technological Institute, Moscow.

Submitted : August 1, 1953

"APPROVED FOR RELEASE: 09/18/2001

CIA-RDP86-00513R000723410015-8

APPROVED FOR RELEASE: 09/18/2001

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APPROVED FOR RELEASE: 09/18/2001

CIA-RDP86-00513R000723410015-8"

Kobozov N.I.

USSR/Kinetics - Combustion. Explosions. Topochemistry. Catalysis. B-9

Abs Jour : Referat Zhur - Khimiya, No 6, 1957, 18629

Author : A.N. Mal'tsev, N.I. Kobozov.

Title : Study of Active Hydrogenation Centers of Ethylene Hydrocarbons. II.

Orig Pub : Zh. fiz. khimii, 1955, 29, No 2, 291-304

Abstract : The catalytic activity of platinized aluminogels and silicagels of filling degrees (α) about 0.0001 to 0.005 was studied at the hydrogenation of C_2H_4 , C_4H_6 and C_5H_{10} . Introduction of little amounts of poison suppresses the activity of catalysts of $\alpha < \sim 0.001$ completely. The authors point out that the hydrogenation kinetics of olefins is described by the equation $\Delta p = \beta \tau^m$ (where Δp is the pressure drop, τ is the time and β is a constant) at all the contacts studied by them, and they cite the differences in the values of m and β detected by them in the straight lines $\log \Delta p = \log \beta + m \log \tau$, drawn over

Card 1/2

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K06026V, N.1.

11297

Nature of cathodic hydrogen. V. V. Morshanova and M. I. Kobzarev (M. V. Lomonosov State Univ., Moscow). *Zhur. Prikl. Khim.* 19, 481-4 (1956), cf. C.A. 47, 6786a. — A charge of H (c.g., 15 g) in 5 ml. NH_4SO_4 was introduced in the cathodic compartment, using 3 different cathodes; the cathodes were alternately polarized with a c.d. of 0.046 amp./sq. cm., and the gas evolved was analysed for H_2 . The current yield of H_2 varied from one to another expt., but generally was greatest for cathodes of smooth Pt, followed by platinumed Pt > amalgamated Pt > amalgamated Pb > Hg. This order did not coincide with that of rising or falling H over voltage. The yield of H_2 was greater at higher temps., and the energy of activation was 12-17 kg. cal., c.g. more typical for chem. than for electrochem. reactions. Presumably, S reacted with evolved H_2 mole, rather than with a.t. H. J. J. Bakerman

"APPROVED FOR RELEASE: 09/18/2001

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APPROVED FOR RELEASE: 09/18/2001

CIA-RDP86-00513R000723410015-8"

KOBOZEV N. I.
USSR/Physics - Quantum mechanics

Card 1/1 Pub. 147 - 7/22

Authors : Kobozev, N. I.

Title : Physical interpretation of the de Broglie equations

Periodical : Zhur. fiz. khim. 29/11, 1989-2006, Nov 1955

Abstract : It is shown that the de Broglie equations should be interpreted as an expression of the conversion of a heavy particle into a new state inaccessible for light quanta, namely, conversion in the γ -layer in zero time when there are only light quanta and other possible relativistic particles void of potential mass. The physical interpretation of this conversion is that each particle, with heavy mass, is an intermittent oscillator, i.e., the particle does not remain constant on the zero time front but oscillates around it with an intermittent amplitude. Thirteen references: 9 USSR, 2 French, 1 Germ. and 1 USA (1909-1954). Drawings; diagrams.

Institution : Moscow State University im. M. V. Lomonosov

Submitted : January 2, 1955

"APPROVED FOR RELEASE: 09/18/2001

CIA-RDP86-00513R000723410015-8

APPROVED FOR RELEASE: 09/18/2001

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APPROVED FOR RELEASE: 09/18/2001

CIA-RDP86-00513R000723410015-8"

KOBOZEV, N.I.

"The Explosive Conversion of Methane, Part 2", Khimicheskaya
Pererabotka neftyanykh Uglevodorodov (Chemical Conversion of Petroleum
Hydrocarbons), Academy of Sciences USSR, Moscow, 1956, pp 142-152

Sum, 1439

KOBOZEV, N.I.

"The Explosive Conversion of Methane; Part 3," Khimicheskaya
Pererabotka neftyanykh Uslavodorodov (Chemical Conversion of Petroleum
Hydrocarbons), Academy of Sciences USSR, Moscow, 1956, pp 153-166

Sum 1439

USSR/Physical Chemistry - Electrochemistry.

B-12

Abs Jour: Referat. Zhurnal Khimiya, No 2, 1958, 3965.

Author : T.T. Bakumenko, O.M. Polterak, N.I. Kobozov.

Inst : Ukrainian Scientific Research Institute of Polym. Industry.

Title : Study of State of Polarized Cathodes in Region of Hydrogen Overstress by Potential Drop Curves.

Orig Pub: Sb. tr. Ukr. n.-i. in-ta poligr. prom-sti, 1956, 4, 135-155.

Abstract: The potential drop after the switching off of the polarizing current on cathodes of pure W, Mo, Ta, Pt, Cu, Pd, Fe, Hg, Pb and Sn and on cathodes of Pt, Pd, Fe poisoned with corrosive sublimate in 0.2 and 0.5 n. HCl solutions was studied. The dependences of (η , $\log i$) under stationary conditions are described by Tafel's equation for all the studied cathodes. The characteristics of the potential drops are presented in graphs of ($\Delta\eta$, $\log i_0 t$), where t is the drop duration.

Card : 1/2

-8-

USSR/ Physical Chemistry - Kinetics. Combustion. Explosives. Topochemistry. Catalysis

B-9

Abs Jour : Referat Zhur - Khimiya, No 4, 1957, 11273

Author : Kobozov N.I.

Title : Physical and Mathematical Foundations of the Theory of Active Centers

Orig Pub : Uspekhi khimii, 1956, 25, No 5, 545-631

Abstract : A review of questions pertaining to nature of active centers, their genesis, function of carriers, mechanism of catalyst poisoning, effect of dispersity on catalytic activity from the standpoint of theory of ensembles. Bibliography 11 references.

KOROLEV, N.I.

Computation method of M.Kh. Karapet'iants. Zhur.fis.khim.30 no.2:464-465
r '56. (Chemistry, Physical and theoretical) (MLA 9:7)

"APPROVED FOR RELEASE: 09/18/2001

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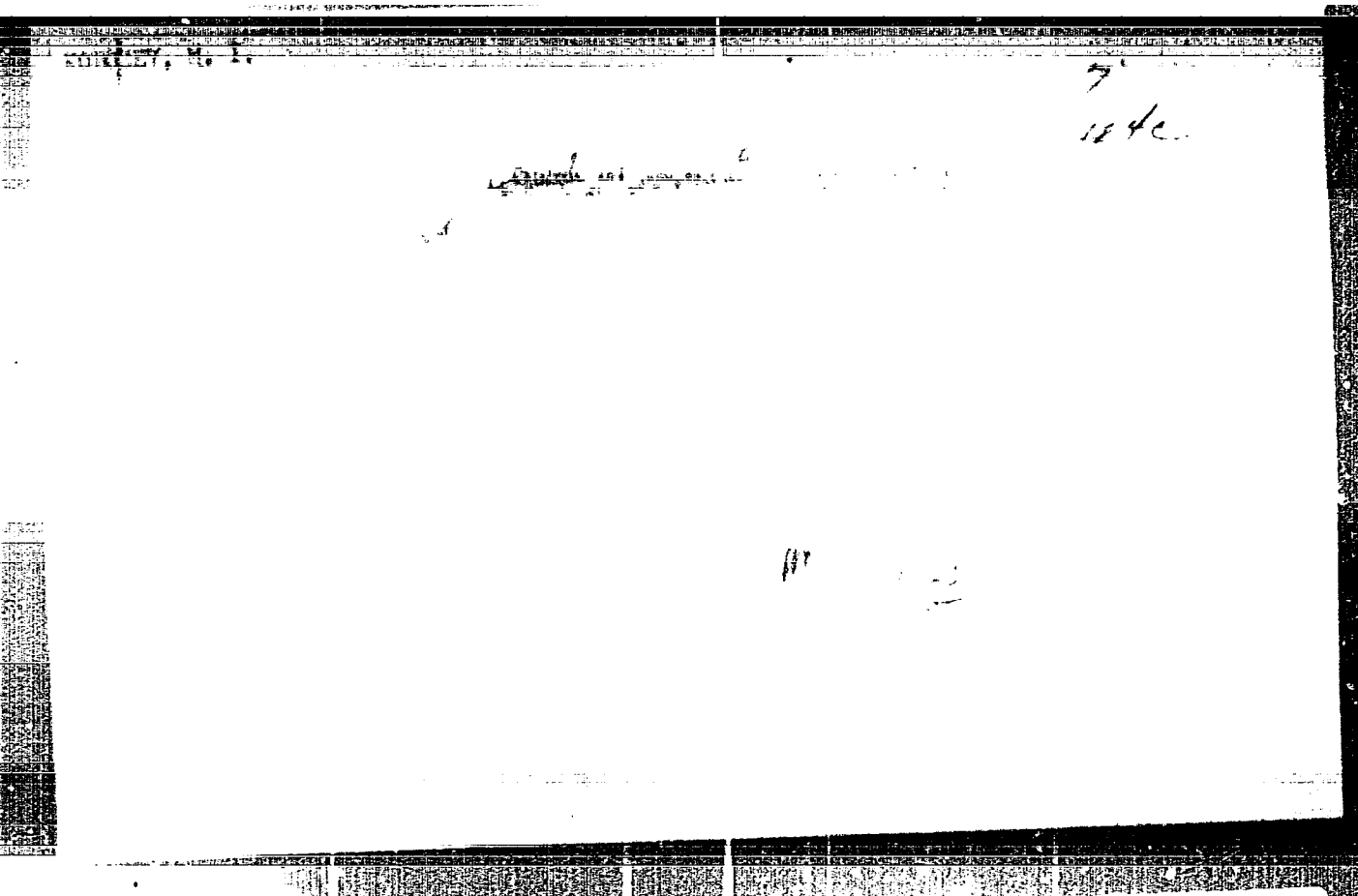
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APPROVED FOR RELEASE: 09/18/2001

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KOBOZEV, N. I.

KRYLOVA, I. V.; ~~KOBOZEV, N. I.~~

Magnetochemistry of active centers. Part 3. A magnetic study of the
photographic process. Zhur. fis. khim. 30 no.11:2483-2488 N '56.
(MLRA 10:4)

1. Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova.
(Photographic chemistry)

"APPROVED FOR RELEASE: 09/18/2001

CIA-RDP86-00513R000723410015-8

APPROVED FOR RELEASE: 09/18/2001

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CIA-RDP86-00513R000723410015-8"

KOBOZEV, M.I., doktor khim.nauk; KAZAROVSKIY, Ya.S., kand.khim.nauk;
MENDELEVICH, I.I., kand.tekhn.nauk

Explosive conversion of methane. Part 1. Trudy GIAP no.71
155-166 '57. (MIRA 1219)
(Methane) (Oxidation)

KAZARNOVSKIY, Ya.S., kand. khim. nauk; DEREVIANKO, I.O.; STEZHINSKIY, A.I.
KOBOZEV, N.I., doktor khim. nauk

Explosive conversion of methane. Part 2. Trudy GIAP no.8:89-105
'57. (MIRA 12:9)

(Methane) (Gas and oil engines) (Fuel--Testing)

KAZARNOVSKIY, Ya.S., kand.khim.nauk; KOROZEV, N.I., doktor khim.nauk;
STREZHINSKIY, A.I.; TORBAN, B.F.

Explosive conversion of methane. Part 3. Trudy GIAP no.8:106-123
'57. (MIRA 12:9)
(Methane) (Gas and oil engines) (Fuel--Testing)

KOBOZEV, N.I.; LEBEDEV, V.P.; SHEKHORALOVA, V.I.

~~XXXXXXXXXX~~ of rarefied adsorption catalysts in chemical industries.

Vest. Mosk. un. Ser. mat., mekh., astron., fis. khim. 12 no.5:
133-144 '57. (MIRA 11:9)

1. Kafedra fizicheskoy khimii Moskovskogo gosudarstvennogo universiteta.
(Catalysts)

Kobozev, N.I.

TEREKHOVA, M.G.; YEREMIN, Ye.N.; KOBZEV, N.I.

Preparation of ethyl alcohol on the basis of electric cracking of
methane gas. Zhur.prikl.khim. 30 no.6:897-903 Ja '57. (MIRA 10:10)
(Ethyl alcohol) (Methane)

KOBOZEV, N.I.
KOBOTZEV, N.I.; SKOROKHODOV, I.I.; NEKRASOV, L.I.; MAKAROVA, Ye.I.

Physical chemistry of concentrated ozone. Part 2: A study of the synthesis of the highest peroxide of hydrogen H_2O_4 by the reaction between concentrated ozone with atomic hydrogen [with summary in English]. Zhur.fis.khim.31 no.8:1843-1850 Ag '57. (MIRA 10:12)

1. Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova.
(Peroxides) (Hydrogen) (Ozone)

KOBOZEV, N.I.

76-10-2/34

AUTHOR: Kobozev, N.I.

TITLE: On the Mechanism of Catalysis. I. (O mekhanizme kataliza. I.)

PERIODICAL: Zhurnal Fizicheskoy Khimii, 1957, Vol. 31, Nr 10, pp. 2162-2183 (USSR)

ABSTRACT:

Present paper deals with the question of the mechanism in the case of a heterogeneous catalysis itself. The mechanism is observed under adsorption-energetical- as well as adsorption-chain aspects. At first the adsorption-energetic aspect of the heterogeneous catalysis is investigated, and it is tried to introduce as few hypotheses as possible and to keep more to facts. The analysis of the mechanism is carried out at a concrete well researched case, the hydrogenation of the ethylene binding. The computations are given here in detail in order to give them a convincing quantitative character. The most important characteristic of an arbitrary catalytic process, its division into two stages, the adsorption- and the reaction stage, is investigated, i.e. the thermodynamics of either stage. It is shown that the positive adsorption heat of the activation of reacting components does not disturb in spite of the decrease of its full energy. Even an important thermal effect does not produce an absolute, i.e. a ther-

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76-10-2/34

On the Mechanism of Catalysis. I.

thermodynamic slowing down of the catalysis. The comparison of computation- and experimental-energetic parameters of a hydration analysis catalysis shows that the here given "ideal catalyser" is very similar to the group of the most active hydration catalysers - Pt, Pd, Ni, Fe - . Then the energetics of the heterogeneous-catalytic hydration is compared to that of the homogeneous-chain-process. The thermodynamics of the activation process is investigated with catalysers under taking into account of the entropy factor and it is shown that the entropy increase of the "substrate" is bound to reduce in an intermediate complex is bound to reduce the velocity of the catalyser. It is shown that the entropy slowing down of the catalytic process has to be a rather extensive phenomenon which accompanies the energetic activation in the case of catalysis. I.e. the energetic weakening of the binding in the "substrate" in its adsorption is a favorable fact for the catalysis; it is the main mechanism of the catalytic activation. The structural loosening up of the complex is, however, a negative fact for the catalysis. The hydration catalysis is investigated with eliminated adsorption stage and thus the rightness of a two stages-scheme of the catalysis proved and shown that in the case of normal hydration the adsorption stage

Card 2/3

Kobenev, N.I.

76-11-2/35

AUTHOR: Kobenev, N.I.

TITLE: On the Mechanism of Catalysis (O mekhanizme kataliza) II. On the Mixed Heterogeneous Chain-Catalysis Mechanism (II. O smeshannom geterogenno-tsopnom mekhanizme kataliza)

PERIODICAL: Zhurnal Fizicheskoy Khimii, 1957, Vol. 31, Nr 11, pp. 2391-2399 (USSR)

ABSTRACT: It is shown that the principles of chain- and catalytic activation differ essentially: Chain activation is based upon the forming and transfer of a free binding from one particle to another; catalysis, on the other hand, takes place with a maximum saving of free bindings which establish a bond immediately in an adsorption- or reaction process either with the active center or with another reacting atom. It is shown that, in-so-far as the formation of a free binding is always connected with a considerable display of energy, reaction, on the occasion of catalysis, usually takes place through smaller energy barriers, i.e. much more effectively. Therefore a combination of heterogeneous catalysis with the tearing off of the unsaturated particles into the volume cannot cause an acceleration of the catalytic process on the surface, which takes place near optimum con-

Card 1/3

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Card 2/3

76-11-2/35

On the Mechanism of Catalysis. II. On the Mixed Heterogeneous Chain-Catalysis Mechanism

The atomic state occurring periodically in the equilibrium as written down above may be interpreted as a periodically formed group of spatially localised valences possessing structural character. There are 21 references, 14 of which are Slavic.

ASSOCIATION: Moscow State University imeni M.V.Lomonosov (Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova)

SUBMITTED: May 3, 1956

AVAILABLE: Library of Congress

Card 3/3

Kobzarev, I.I.

76-11-25/35

AUTHORS:

Kobzarev, N.I., Lebedev, V.P., Strakhov, B.V.,
Zykova, G.Y.

TITLE:

The Physical Chemistry of Concentrated Ozone (Fiziko-khimiya kontsentrirrovannogo ozona) III. The Explosive Oxidation of Nitrogen in Mixtures Containing Concentrated Ozone (III. Vzryvnoye okisleniye azota v smesyakh s kontsentrirrovannym ozonom)

PERIODICAL:

Zhurnal Fizicheskoy Khimii, 1957, Vol. 31, Nr 11, pp. 2547-2550 (USSR)

ABSTRACT:

An oxidation of nitrogen under explosion in mixtures with concentrated ozone within the pressure range of from 25 to 100 mm torr was carried out. It is shown that within this range a linear increase of the nitrogen oxide leakage was observed in the case of increased pressure. The nitrogen oxide leakage curves in dependence on the composition of the initial mixture pass through a maximum at about 75% O₃. In the case of the here employed composition and the highest experimental pressure exercise (150 mm) the nitrogen oxide leakage amounted to about 2%. Comparatively small additions of oxygen considerably reduce this leakage. There are 4 figures and 3 Slavic references.

Card 1/2

76-11-25/35

- The Physical Chemistry of Concentrated Ozone. III. The Explosive Oxidation of Nitrogen in Mixtures Containing Concentrated Ozone

ASSOCIATION:

Moscow State University imeni M.V.Lomonosov (Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova)

SUBMITTED:

September 18, 1956

AVAILABLE:

Library of Congress

Card 2/2

KOBOSEV, N.I.

76-12-19/27

AUTHORS:

Krylova, I.V., Kobosev, N.I.

TITLE:

The Magnetochemistry of Active Centers (Magnetokhimiya aktivnykh tsentrov). V. Photocatalytic and Photomagnetic Effects With Adsorption- and Crystalline Catalysts (V. Fotokataliticheskiy i fotomagnitnyy efekty u adsorbtsionnykh i kristallicheskikh katalisatorov).

PERIODICAL:

Zhurnal Fizicheskoy Khimii, 1957, Vol. 31, Nr 12, pp.2725-2732 (USSR)

ABSTRACT:

The present report arose from an observation during the investigation of the magnetochemistry of a photographic process [Ref.1]. It has turned out that with a permanent illumination of the silver precipitated by the photolysis of AgCl , with a mercury-quartz-lamp, the magnetisability of the silver increases very intensely and that it passes over from the range of diamagnetism to that with a considerable paramagnetism. Consequently, there is also a photocatalytic effect besides the photomagnetic one. In this context the investigation of the action of radiation on the magnetical and catalytical properties of other metals (Pt, Pd) at various physical states (adsorption-layers, blackness) was carried out. The following systems were investigated: 1.) Catalysts of adsorption: Pt/SiO_2 with a degree

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The Magnetochemistry of Active Centers. V. Photocatalytic
and Photomagnetic Effects With Adsorption- and Crystalline
Catalysts

76-12-19/27

of filling $\alpha = 0.0178$, Pt/Al_2O_3 with $\alpha = 0.001$, Pd/SiO_2 with $\alpha = 0.01$. 2.) Platinum- and palladium-blackness. The basic result of this work consists in the determination of the photosensitivity of the metals with respect to their magnetical and catalytical properties and a substantial increase of the two effects at the transition of powders to the adsorption-layers (to the metals on the carriers). This difference consists in an approximately 100 times decrease of the exposure time in the case of the adsorption-layers in comparison with the powders (in view of obtaining the same photomagnetic and photocatalytic effect). With platinum and palladium the radiation with a non-filtrated light of a mercury quartz lamp produces a decline of catalytic activity with simultaneous increase of paramagnetism. In the next work it will be explained that the photosensitivity shows a certain distribution in the spectrum. The assumption is expressed that the effects found here are correlated with the formation of exo-electrons under the action of light. The metal-atoms and their ensembles can be considered in this context as electron-donors and the trap-levels of the carrier can be considered as their acceptors. In the case of dielectric carriers a return of the exo-electrons to the metal ions is rendered very

Card 2/3

The Magnetochemistry of Active Centers. V. Photocatalytic and Photomagnetic Effects With Adsorption- and Crystalline Catalysts

76-12-19/27

difficult since there is very little probability for these electrons to reach the carrier-conductive-zone and with this that zone, which represents a common zone with the adsorbed Me^+ -ions. In this way there is very little probability given for a reversibility of the ionisation process and a quick obtaining of photomagnetic and photocatalytic effects is guaranteed. - With metals, the picture is inverse. There is a wide conductive zone which requires the necessity of a longer exposure (to light). The primary cause for the decline of the catalytic activity at illumination is presumably the formation of non-active ions instead of the active adsorbed metal atoms. The non-active ions lose the catalytic properties on account of the loss of the valence electrons and their capture by the trap levels, or by the adsorbed gas. There are 5 figures, and 18 references, 11 of which are Slavic.

ASSOCIATION: Moscow State University imeni M.V.Lomonosov (Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova).
 SUBMITTED: October 5, 1956
 AVAILABLE: Library of Congress
 Card 3/3

KOBOEV, Nikolay I, LEBEDEV, V. P. and SHEKOBALOVA, Valentina I.

"Anwendung verdünnter Adsorptionskatalysatoren in der Chemischen Industrie."
Chemische Technik, May 1958.

KOBOZEV, N.

H-11

Country : Germany
 Date :
 No. : 46408

Author : Kobozew, N.; Lebedew, W.; Schechobalowa, W. I.
 Title : The Use of Adsorption Catalysts in Chemical Industry

Period. : Chem. Techn., 1958, 10, No 5, 278-282

Abstract : A review. Bibliography 28 references.

Card 1

AUTHOR:

Kobozew, N. I.

TITLE:

On Reversibility in Chemical Thermodynamics (Ob obratimosti v khimicheskoy termodinamike)

PERIODICAL:

Zhurnal fizicheskoy khimii, 1958, Vol 32, Nr 9, pp 2209-2212 (USSR)

ABSTRACT:

Within the limits of our thermodynamics it is impossible to create a completely closed cycle. This results from the fact that in the completely irreversible processes of nature the loss of free energy and the increase in the entropy should be infinite, and that in the so-called reversible processes there can never be complete closure. From this it follows that there are two alternatives: either it is allowed that reversible processes as well as irreversible processes condition nature toward a particular direction, in that case this change has to be formulated and a measure has to be found for it, as did Clausius in his time for the irreversible processes of entropy; or it is necessary to reevaluate several basic concepts of thermodynamics and to indicate that reversible processes are possible only with complete closure.

Card 1/2

On Reversibility in Chemical Thermodynamics

SOV/76-32-9-40/46

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova
(Moscow State University imeni M. V. Lomonosov)

SUBMITTED: November 26, 1957

Card 2/2

SOV/76-32-10-14/39

5(4)
AUTHORS:

Yeremin, Ye. N., Kobozov, N. I., Lyubkovskaya, B. G.

TITLE:

The Conversion of Methane to Acetylene in the High-Voltage Arc
(Pervrashcheniye metana v atsetilen v vysokovol'tnoy duge)
I. The Effect of Pressure (I. Vliyaniye davleniya)

PERIODICAL:

Zhurnal fizicheskoy khimii, 1958, Vol 32, Nr 10, pp 2315-2323
(USSR)

ABSTRACT:

The experimental data were obtained at the Gosudarstvennyy institut azotnoy promyshlennosti (State Institute of Nitrogen Industry). According to earlier papers (Refs 1-3) it may be assumed that a silent discharge of the type occurring in the Siemens ozonizer does not lead to an acetylene formation. In the papers by Ye. N. Yeremin, M. Z. Al'tshuller, Z. I. Kir'yashkina and V. V. Igonin (Ref 5) and A. B. Tsentsiper (Ref 6) it was found that discharges at low pressure and low amperages are not efficient. D. K. Koller (Ref 4), who also worked with a glow discharge, found 90-100 mm to be the optimum pressure at an amperage of 100 mA. N. P. Bozhko et al. (Refs 7-9) showed that in a discharge in the high-voltage arc at a pressure of 35 mm up to 17 Vol% acetylene may be obtained in the reaction

Card 1/3

SOV/76-32-10-14/39

The Conversion of Methane to Acetylene in the High-Voltage Arc. I. The Effect of Pressure

products. In the experiments by Ye. N. Yeregin (Refs 10,16) it was found that the course of the reaction does not depend on the amperage but on the "specific Energy". The latter concept was introduced by S. S. Vasil'yev, M. I. Kobozev and Ye. N. Yeregin (Ref 11) and was also used by D. K. Koller (Ref 4) as "Parameter q". A kinetic evaluation of the results obtained by Rudder and Biedermann (Biderman) (Ref 13) by the authors of the present paper showed that a 12-fold acceleration in the conversion is obtained by a drop of the pressure from 760 to 88 mm (1500°). Investigations were carried out in the high-voltage arc at different pressures, especially from 70 mm to somewhat above 1 atmosphere absolute pressure in a reactor the diagram of which is given. The analyses of the Saratov gas used and the reaction products were carried out by means of the gas analyzer VTI. A drop in pressure considerably improves the conversion. At a pressure of 70-100 mm and the value $U/v \approx 3,5$ the percentage of acetylene in the gas reaches the value 16,6 and the general cracking -0,73 at an energy consumption of 11,2 kilowatt-hour/cm³ C₂H₂. It was found that the "Limiting Concentration" mentioned by N. P. Bozhko does not amount to 4%

Card 2/3

5(4)

AUTHORS:

Yeremin, Ye. N., ~~Kobozov, N. I.~~,
Lyudkovskaya, B. G.

SOV/76-32-12-17/32

TITLE:

The Conversion of Methane Into Acetylene in a High Voltage
Arc (Prevrashcheniye metana v atsetilen v vysokovol'tnoy duge)
II. The Effect of Hydrogen (II. Vliyaniye vodoroda)

PERIODICAL:

Zhurnal fizicheskoy khimii, 1958, Vol 32, Nr 12,
pp 2767 - 2771 (USSR)

ABSTRACT:

The contradictory results of earlier experiments are discussed (Refs 2 to 11). The investigation was carried on to determine the effect of hydrogen admixture on the methane cracking in an electric arc. Experiments were carried out by means of an alternating current high voltage arc at atmospheric pressure; the methane and hydrogen ratios were 69.4:27.2, 59.1:37.2 and 48.8:48.4. It was found that the general cracking of methane increases at a hydrogen admixture of up 37%, while the acetylene concentration and the chemical energy yield (0.184 m³/kWh) remain unchanged. In practice, this means that acetylene may be produced in the same apparatus with both pure methane and methane

Card 1/2

The Conversion of Methane Into Acetylene in a High
Voltage Arc. II. The Effect of Hydrogen

SOV/76-32-12-17/32

containing a hydrogen admixture. Under these test conditions
hydrogen acted as an inert diluent without active in-
fluence on the methane transformation. There are 2 figures,
1 table, and 12 references, 7 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova
(Moscow State University imeni M. V. Lomonosov)

SUBMITTED: May 4, 1957

Card 2/2

5(4)

AUTHORS:

Yastrebov, V. V., Kobozov, N. I.

SOV/76-33-3-22/41

TITLE:

Physical Chemistry of Concentrated Ozone (Fiziko-khimiya kontsentrirrovannogo ozona). IV. Explosibility of Concentrated Ozone Under Thermal Effects (IV. Vzryvnaya chuvstvitel'nost' kontsentrirrovannogo ozona po otnosheniyu k teplovym vozdeystviyam)

PERIODICAL:
ABSTRACT:

Zhurnal fizicheskoy khimii, 1959, Vol 33, Nr 3, pp 649-655 (USSR)
The previous paper was published in Zhurnal fizicheskoy khimii, 1957, Vol 31, pp 2547. The present experimental results were obtained in the paper (Ref 1). Recently two papers were published (Refs 2,3) in which the explosibility of mixtures of ozone and oxygen as a function of the effect of an electric spark was investigated. No investigations were made, however, of the explosibility of pure liquid or gaseous ozone. A well-suited method for these determinations consists in the measurement of the minimum temperature and the minimum energy which is required for causing an explosion by means of electrically heated wire resistors.

Card 1/3

Physical Chemistry of Concentrated Ozone. IV. Explosibility SOV/76-33-3-22/41
of Concentrated Ozone Under Thermal Effects

In the present case tungsten wires were used for this purpose and a corresponding electric circuit was devised (Fig 1). The checks were made by means of a Dewar container (Fig 2). Liquid ozone bursts as soon as the wires have attained a temperature of 210-220°, gaseous ozone bursts already at 100°C, the wire thickness being unimportant. Experiments in which heated metal plates are hit by drops of liquid ozone, have shown that an explosion at 100-200°C takes place irrespective of the kind of metal, which confirms the above-mentioned observations. As far as thermal effects concerned, liquid ozone is more sensitive than nitro-glycerin and nitrogen chloride (Ref 4). Since gaseous ozone bursts sooner than liquid ozone, it is assumed that in the explosion of liquid ozone first part of O₃ evaporates, the resulting gas bursts and the explosion is then transferred to the liquid. The temperature difference between the initiating temperature of gaseous and liquid O₃ is assigned to the thermal energy that

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Physical Chemistry of Concentrated Ozone. IV. Explosibility SOV/76-33-3-22/41
of Concentrated Ozone Under Thermal Effects

is required for evaporation of the aforesaid portion of
liquid O_3 . There are 3 figures, 3 tables, and 10 refer-
ences, 5 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova
(Moscow State University imeni M. V. Lomonosov)

SUBMITTED: August 2, 1957

Card 3/3

5(4)

SOV/76-33-5-8/33

AUTHOR: Kobosev, N. I. (Moscow)

TITLE: A Generalisation of the Theory of Intermediate Products and Latent Forms of Catalysis (Obobshcheniye teorii promeshutochnykh produktov i skrytyye formy kataliza)

PERIODICAL: Zhurnal fizicheskoy khimii, 1959, Vol 33, Nr 5, pp 1002 - 1015 (USSR)

ABSTRACT: The kinetic theory of intermediate products is considerably limited by the assumption that intermediate products are formed from normal molecules only of the catalyst and substrate without previous activation. The activation of the substrate, however, considerably effects the kinetics of the reaction and the functional dependence between the rate of catalysis and the concentration of the catalyst. It is very difficult to find the elementary members of the reaction from the kinetic law observed because there are nearly always hidden parameters of the process. By these parameters those characteristic values (rate of partial reactions, their equilibrium constants, etc) are meant which do cause the partial reactions but do not appear in the kinetic law of the reaction

Card 1/3

A Generalization of the Theory of Intermediate Products SOV/76-33-5-8/33
and Latent Forms of Catalysis

(within the measuring accuracy of an experiment). Many of these processes have not yet been recognized and are considered non-catalytic processes. Reaction formulas are deduced for these intermediate processes with activated molecules of the substrate, and the conditions of "hidden catalysis" thermodynamically and kinetically analyzed. The equation for the activated catalysis is deduced as a function of the concentration of the catalyst and shown in figure 1. According to the type of $v = f(\phi)$ three ranges can be distinguished: 1) $v = KR\phi$, the range of "normal catalysis", 2)

$v \approx k \cdot \phi^{\frac{1}{n}}$, the range of transition catalysis ($n \geq 1$), and 3)

$v \approx k$ and $\left(\frac{\partial v}{\partial \phi}\right) \approx 0$, the range of "hidden"(latent) catalysis.

Figure 2 shows four examples of activated catalysis in the form of diagrams. They range from the case of oxydative polymerisation to the biological effect of heavy metal ions. Smallest concentrations of the probable catalyst are used in

Card 2/3

A Generalization of the Theory of Intermediate Products SOV/76-33-5-8/33
and Latent Forms of Catalysis

discovering such latent catalyses. There are 2 figures, 3
tables, and 9 references, 7 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova
(Moscow State University imeni M. V. Lomonosov)

SUBMITTED: September 18, 1957

Card 3/3

5(4)

AUTHORS:

Yastrebov, V. V., Pitskhelauri, Ye. N.,
Kobzarev, N. I.

SOV/76-33-6-7/44

TITLE:

Physical Chemistry of Concentrated Ozone (Fiziko-khimiya
kontsentrirrovannogo ozona).
VI. Explosion Susceptibility of Ozone-Oxygen Solutions With Respect
to Thermal Impulses (VI. Vozymnaya otkuvstivitel'nost' ozono-kislorodnykh
rastvorov po otnosheniyu k teplovym impul'sam)

PERIODICAL:

Zhurnal fizicheskoy khimii, 1959, Vol 33, Nr 6, pp 1209-1213 (USSR)

ABSTRACT:

An investigation was carried out of the explosion susceptibility (ES) of liquid ozone - oxygen (I) mixtures (with 15 - 90% ozone) with respect to heat impulses by the method of electric ignition. The (I) mixtures in different concentrations were sealed in glass ampoules, in which tungsten wires were introduced by a special procedure. Two series of experiments were made (with higher concentrated mixtures (with respect to ozone) and smaller sampling quantities on the one hand, and experiments with low concentrated mixtures and larger sampling amounts (up to 150 cm³) on the other), which differed somewhat as to the working technique. For each experimental series, determination was made of the two values (burning energy of the wire, and the Joule heat liberated with the current passage through the

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Physical Chemistry of Concentrated Ozone. VI. Explosion SOV/76-33-6-7/44
Susceptibility of Ozone-Oxygen Solutions With Respect to Thermal Impulses

wire). Seven experimental series were carried out, five of which under laboratory conditions, and two on a larger scale. Experimental data for each of these series are given separately (Table 1) as well as data concerning the (ES) with respect to the different thermal impulses (Table 2). Results show that the (ES) of ozone drops sharply with dilution by oxygen. The explosion limit is set at the ozone concentration c (in wt%), in which the thermal impulse exhibits a lower energy E (in cal) than would be required on the strength of equation $E = 186 \exp(-c/6.9)$. There are 1 figure, 2 tables, and 3 references, 2 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova
(Moscow State University imeni M. V. Lomonosov)

SUBMITTED: September 5, 1957

Card 2/2

5 (4)

AUTHORS:

Yastrebov, V. V., Kobozov, N. I.

SOV/76-33-8-5/39

TITLE:

Physical Chemistry of Concentrated Ozone. VII Concentration Limits of Flame Propagation in Gaseous Ozone Mixtures

PERIODICAL:

Zhurnal fizicheskoy khimii, 1959, Vol 33, Nr 8, pp 1701-1708 (USSR)

ABSTRACT:

The experimental material contained in the present paper was mentioned in (Ref 1). The explosiveness (E) of the following gas mixtures was investigated: ozone (I) + oxygen (II), (I) + nitrogen (III), (I) + carbon dioxide (IV), (I) + argon (V), (I) + chlorine (VI), and (I) + carbon tetrachloride vapor (VII). The explosions took place in two cylindrical glass vessels of different dimensions at a total pressure of up to 1 atm in an appropriate unit (Fig 1). The ignition was by an electric spark between two platinum wires, the pressure reading being taken by means of an Hg-manometer. The studies of the (I)-(II) mixtures were undertaken at various temperatures between -77° and $+60^{\circ}\text{C}$, and the share of decomposed (I) was found by the rise in pressure. Studies of the mixing of (I) and (II) were made (Table 2). The results obtained in the experiments (Table 1) show that the explosion limit (EL) of the (I)-(II) mixtures is independent of the size of the reaction vessel, as well as of the ignition

Card 1/2

Physical Chemistry of Concentrated Ozone. VII Con-
centration Limits of Flame Propagation in Gaseous Ozone Mixtures

SOV/76-33-8-5/39

spark force. At a lowering of the temperature, the (EL) rises rapidly, amounting to 14.3 mol% (I) at -77° and 1 atm. Further experiments showed that in the systems (I) + (II), (I) + (III), (I) + (IV), and (I) + (V) there are very distinct concentration limits of the (E). In the coordinates $P_{O_2} - P_x$ (P_x = partial

pressure of the gas added to (I)) these limits constitute monotonous functions approaching linearity as the pressure increases. In the systems (I) + (VI) and (I) + (VII) these limits are somewhat blurred. Diatomic gases and (IV) exhibit practically the same (EL), i.e. 10.4 mol% (I) (1 atm, 20°C), while the (EL) is somewhat lower for (V) (8.8 mol% (I)), and somewhat higher for (VII) than in case of the other mixtures. There are 11 figures, 2 tables, and 5 references, 1 of which is Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova
(Moscow State University imeni M. V. Lomonosov)

SUBMITTED: September 5, 1957
Card 2/2

5-(0)

AUTHORS:

Kobosev, N. I., Nekrasov, L. I.

05847

SOV/76-33-10-45/45

TITLE:

Yevgeniy Nikolayevich Yeregin (On His 50th Birthday)

PERIODICAL:

Zhurnal fizicheskoy khimii, 1959, Vol 33, Nr 10, pp 2387 - 2388
(USSR)

ABSTRACT:

Ye. N. Yeregin, Professor of Moskovskiy gosudarstvennyy universitet (Moscow State University) and Doctor of Chemical Sciences, celebrated his 50th birthday on January 14, 1959. He is a well-known physicochemist who has obtained important results in the field of gas electrochemistry. In 1930, he graduated from the khimicheskii fakul'tet Moskovskogo universiteta (Chemical Department of Moscow University) and then worked in various industrial enterprises, institutes and colleges. He completed his first scientific work at the Chernorechenskiy khimicheskii kombinat (Chernorechenskiy Chemical Kombinat) which dealt with the purification of hydrogen sulphide. At the same time he studied thermodynamic problems of gases in high-temperature processes. In 1932, Ye. N. Yeregin began to investigate problems of electric oxidation of nitrogen and of the electrocracking of methane gases into acetylene at the Institut azota (Institute for Nitrogen). He has continued this work at the Chemical Department of Moscow

Card 1/3

Yevgeniy Nikolayevich Yerevin (On His 50th Birthday) ⁰⁵⁸¹⁷ SOV/76-33-10-45/45

University. Between 1932 and 1937 he made several investigations concerning the reaction kinetics in electric discharges in co-operation with N. I. Kobosev and S. G. Vasil'yev. Some important results were obtained which partly formed the subject-matter of Ye. N. Yerevin's candidate thesis (1937). Results of investigations of the three afore-mentioned authors led to the introduction of a new parameter into gas electrochemistry, namely, "specific energy" U/v . In 1949 Ye. N. Yerevin (together with N. I. Kobosev et al.) designed a new apparatus for the electrocracking of methane into acetylene, and in 1950 he devised a new method used in the electrosynthesis of concentrated nitric acid from air and water. From 1948-1949 onward Yerevin assisted in the research of the electrosynthesis of hydrogen peroxide and ozone carried out at the laboratoriya kataliza i gazovoy elektrokhimii khimicheskogo fakul'teta (Laboratory for Catalysis and Gas Electrochemistry of the Chemical Department), and in co-operation with N. I. Kobosev and L. I. Nekrasov he developed a method used for the preparation of H_2O_2 by bombarding liquid ozone with atomic hydrogen. In 1951 ²⁴ Ye. N. Yerevin completed his doctor thesis at the Chemical Department of Moscow University, and since 1952 he has been Professor of the Chair of Physical

Card 2/3

YEMEL'YANOVA, G.I.; LEBED'EV, V.P.; KOBOZEV, N.I.

Catalytic decomposition of liquid ozone at low temperatures. Part 1:
Kinetics of low-temperature catalysis on platinum black. Vest. Mosk.
un. Ser. 2:7-9 1960. (MIA 1412)

1. Kafedra fizicheskoy khimii Moskovskogo universiteta.
(Ozone) (Platinum)

S/189/60/000/004/002/006
B002/B060

11.1190

AUTHORS: Nekrasov, L. I., Kobosev, N. I., Yeregin, Ye. N.

TITLE: Low-temperature Reactions of Atoms and Radicals.
Contribution I. Synthesis of Hydrogen Peroxide From Water Vapor //

PERIODICAL: Vestnik Moskovskogo universiteta. Seriya 2, khimiya, 1960,
No. 4, pp. 12 - 18

TEXT: Attempts were repeatedly made in the past to produce hydrogen peroxide by electric-glow discharge in water vapor, and to achieve a high concentration of it by freezing out with liquid nitrogen. The authors of the present paper conducted an investigation into the dependence of the yield on feed, water vapor pressure, construction and cooling temperature of the traps, arrangement of the channels between discharge tube and traps, and the intensity of discharge. A report is made here of the influence exerted by construction and temperature of the traps. The following conditions were chosen: water vapor pressure 0.5 torr, amperage 0.135 a, voltage 1000 to 1200 v. A scheme of the apparatus is shown

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Card 2/2

80225

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B010/B009

5.1310

AUTHORS: Kobozov, N. I., Samokhin, I. A., Sindukov, V. G. (Moscow)

TITLE: Physico-chemical Investigation of the Electrosynthesis of Concentrated Hydrogen Peroxide From Its Elements. I. Kinetics of the Electrosynthesis of H_2O_2

PERIODICAL: Zhurnal fizicheskoy khimii, 1960, Vol. 34, No.4, pp. 773-781

TEXT: The present paper contains data obtained by investigating the electro-synthesis of H_2O_2 at the MGU (MSU) between 1947 and 1950. The influence of temperature upon the H_2O_2 yield and concentration in the case of a synthesis in a silent electric discharge was investigated. For this purpose a laboratory plant (Fig. 1) was designed, containing a reaction vessel which consisted of three cylinders placed inside one another. The reaction vessel had a volume of 200 cm^3 , an operating area of 700 cm^2 , and was charged with alternating current. The composition of the initial gas mixture was determined by means of a VTI gas analyzer. The experimental results obtained at temperatures ranging from

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Physico-chemical Investigation of the Electro-
synthesis of Concentrated Hydrogen Peroxide From
Its Elements. I. Kinetics of the Electrosynthesis
of H_2O_2

-35° to $+62^{\circ}C$ at a pressure of 500 torr and flow rates between 3.7 and 3.8 l/h are given in Table 1 (Reaction vessel capacity 10.3 w, initial gas mixture composed of approximately 96.5% of H_2 and 3.5% of O_2). At $80^{\circ}C$ an 80% hydrogen peroxide is obtained. A temperature rise from -35° to $+8^{\circ}C$ virtually does not affect the yield and concentration of H_2O_2 . A further temperature increase to $+62^{\circ}C$, however, causes the H_2O_2 yield and concentration to drop abruptly. 4

The activation energy of the hydrogen peroxide formation in a silent electric discharge was calculated to be 1200 cal/mole. This low value agrees well with analogous values obtained in the photochemical synthesis of hydrogen peroxide, thus pointing to common traits in the conditions in both syntheses. It was found that H_2O_2 yield passes through a maximum as the flow rate of the reaction mixture is increased (at 4-5 l/h, not at 0.4 l/h, as Wolf (Ref. 12) states). On the other hand, the overall oxygen amount (for the formation of H_2O_2 and H_2O) increases as the flow rate of the gas mixture decreases.

Card 2/3

8156?
S/076/60/034/06/06/040
B015/B061

5.1190

AUTHORS: Mal'tsev, A. N., Kobozov, N. I., Semenova, T. V.,
Karpova, Ye. I. (Moscow)

TITLE: Some Structural Problems of Hydrogenation Catalysis III

PERIODICAL: Zhurnal fizicheskoy khimii, 1960, Vol. 34, No. 6,
pp. 1190-1199

TEXT: The connection between the structure of a hydrocarbon to be hydrogenated, and the structure of the active center of the catalyst was examined. The number of atoms in the active ensemble of the platinum and palladium catalysts were already calculated in the authors' laboratory and by other researchers (Table 1, data on the hydrogenation and dehydrogenation tests). The present examinations took place on the hydrogenation of 1-heptene, cyclohexene, methylcyclohexane, and 1,3-cyclohexadiene (Table 2, refractive indices) in an ethanol solution at 25°C on silica gel with a very thinly applied (0.001-0.02 monatomic) layer of platinum. The experimental diagrams (Fig. 1) of the dependence of the activity of the degree of occupation of the catalyst show three maxima.

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Some Structural Problems of Hydrogenation
Catalysis III

81567
S/076/60/034/06/06/040
B015/B061

A. V. Bukhman, and Yu. G. Lapin are mentioned in the text. There are
7 figures, 4 tables, and 15 references: 14 Soviet and 1 German.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova
(Moscow State University imeni M. V. Lomonosov)

SUBMITTED: June 30, 1958

Card 3/3

✓

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51340

1296

S/076/60/034/007/015/042/XX
B004/2058

51190

2209, 1274, 1208

AUTHOR:

Kobozov, N. I.

TITLE:

Mechanism of Catalysis. III. Valence and Energy Forms of Heterogeneous and Ferment Catalysis

PERIODICAL:

Zhurnal fizicheskoy khimii, 1960, Vol. 34, No. 7, pp. 1443-1459

TEXT: This is a theoretical study on catalysis. The starting point is the fact that the investigation of the mechanism of catalysis can be performed only on the basis of an active-center theory which gives information on the character, structure, number, and absolute activities of the centers. It was stated by the author (Refs. 2, 3) that the valence mechanism is inadequate to activate heterogeneous catalysis, for which an energy chain is required. Here, this conception is further developed. The different activities of heterogeneous (inorganic) and microheterogeneous (biological) catalysts is discussed. On the basis of the unity theory, the activities of inorganic heterogeneous catalysts and ferments are based on the same principle. Both consist of two components, i.e., active centers (active

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87762

Mechanism of Catalysis. III. Valence and Energy S/076/60/034/007/015/042/XX
Forms of Heterogeneous and Ferment Catalysis B004/B068

unity in inorganic catalysts, active functional group in the ferment) and a carrier bound to them by adsorption (inert carrier or crystal lattice of inorganic catalysts, specific protein components in ferments). The activity of the ferments which is higher by several orders of magnitude, is explained by an "aggravation effect", and by the example of the NH_2 group it is shown how their activity is increased by complicating the molecule structure (in the sequence methyl amine - cystine - carboxylase). This aggravation effect cannot be due to the valence mechanism. In this case, the purely structural chemical conception disregards an important factor, i.e., the energy character of aggravation which is demonstrated by the dependence of activity on the thermal effect Q of the catalyzed reaction. A generally valid law is derived for the activation of catalysts: $a = a_0 \exp \gamma (Q_r - q)$ - $a_0 \exp(\gamma \eta Q_r)$ (6). $(Q_r - q)$ is the amount of energy absorbed by the carrier (lattice or protein carrier); q is the energy threshold of "self-activation"; γ is the retransfer coefficient of energy to the active centers; $\eta = (Q_r - q)/Q_r$ is the recuperation degree of the reaction

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Mechanism of Catalysis. III. Valence and Energy Forms of Heterogeneous and Ferment Catalysis

S/076/60/034/007/015/042/XX
B004/B068

energy; a_0 is the valence activity (for $\gamma \eta Q_r = 0$). The essential difference between ferment and heterogeneous catalyst is only in the values of these coefficients given in Table 5:

Catalyst	Q, kcal	η	γ	Activity a	
				Valence Activity, a_0 , Molecules per Second, of the Center	Self-activation Energy of the Center
A) Ferments	0	1	0.23	1 - 2	$(1-2)\exp 0.23 Q_r$
B) Heterogeneous Catalysts					
a) for Q_r 20kcal	20	0-0.6	0.16	0.5-1.5	$(0.5-1.5) \cdot 1$
b) for Q_r 20kcal	20	0-0.6	0.16	1	$1 \cdot \exp(0.16 Q_r - 20)$

It is assumed that the energy absorbed Q_r is supplied in the form of an

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Mechanism of Catalysis. III. Valence and
Energy Forms of Heterogeneous and Ferment
Catalysis

S/076/60/034/007/015/042/XX
B004/B068

exciton to the carrier (protein or crystal). O. M. Poltorak, V. S. Chesalova, N. A. Reshetovskaya, A. A. Lopatkin, V. M. Shekhobalova, V. P. Lebedev, N. A. Mal'tsev, A. K. Semenova, A. N. Terenin, G. K. Boreskov, D. V. Sokol'skiy, S. P. Bukhman, M. N. Danchevskaya, L. L. Klyachko-Gurvich, V. B. Yevdokimov, Zh. V. Strel'nikova, I. V. Krylova, and Shcheglov are mentioned. There are 4 figures, 5 tables, and 47 references: 39 Soviet, 4 US, 3 British, and 8 German.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova
(Moscow State University imeni M. V. Lomonosov)

SUBMITTED: September 13, 1958

Card 4/4

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8/076/60/034/07/06/009
B015/B070

AUTHORS: Strakhov, B. V., Yegorov, V. P., Lebedev, V. P.,
Kobozov, N. I.

TITLE: The Physical Chemistry of Concentrated Ozone. IX. The
Dependence of the Yield of Nitric Oxide on the Explosion
Temperature of Ozone - Nitrogen Mixtures ✓

PERIODICAL: Zhurnal fizicheskoy khimii, 1960, Vol. 34, No. 7,
pp. 1524-1527

TEXT: Investigations were made on the dependence of NO yield on the composition of ozone - nitrogen mixture for constant temperature of explosion and an initial pressure of 100 torr, as well as for constant compositions of the initial gaseous mixture. The experiments were performed in an apparatus already described (Ref. 1). The temperature of the explosion was controlled by introducing stoichiometric mixtures of methane and ozone in the explosion pipette. The isotherms of NO yield (Fig. 4) obtained for the constant temperatures of 3000° and 3500°K of explosion show a maximum for a 40% ozone content in the mixture. If the composition of

Card 1/2

4/1

STRAKHOV, B.V.; LEBEDEV, V.P.; KOBOZEV, N.I.

Physical chemistry of concentrated ozone. Part 10: Effect of the vessel diameter on the yield of nitric oxide in the explosive oxidation of nitrogen-ozone mixtures. Zhur. fiz. khim. 34 no.8:1706-1708 Ag '60.
(MIRA 13:9)

1. Moskovskiy gosudarstvennyy universitet im. M.V.Lomonosova.
(Nitrogen) (Ozone) (Nitrogen oxide)

83693

S/076/60/034/008/006/014
B015/B054

5.1190 (1231)

AUTHORS: Danchevskaya, M. N. and Kobozov, N. I. (Moscow)

TITLE: Catalysis by Metal Vapors. I. Catalytic Properties of Zinc- and Cadmium Vapors

PERIODICAL: Zhurnal fizicheskoy khimii, 1960, Vol. 34, No. 8,
pp. 1728-1733

TEXT: To establish the influence of a carrier on the catalytic activity, the authors investigated the catalytic properties of compact, deposited, and vaporous metals (Cd metal, Cd/SiO₂, Zn/SiO₂, Cd vapor, Zn vapor), as well as of corresponding semiconductors (containing ZnO, ZnS, CdO as impurities). The present paper describes the first of these investigations dealing with vaporous zinc and cadmium. The catalytic activity was determined in a high-vacuum plant (Fig. 1) on the dehydrogenation of methanol ($\text{CH}_3\text{OH} \rightarrow \text{CO} + \text{H}_2$). It was found that Cd and Zn, in vapor phase, catalyze the methanol decomposition, i.e. also the metal atoms isolated from the crystal lattice maintain their catalytic properties. ✓

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Catalysis by Metal Vapors. I. Catalytic
Properties of Zinc- and Cadmium Vapors

83693

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B015/B054

The kinetic curves (Fig. 3) show that the catalytic activity of Cd vapors is lower than that of Zn vapors. Investigations of the absorption spectrum of the reaction ampul before and after the experiment with a 3MP-2 (ZMR-2) mirror monochromator, as well as examinations of the influence of the reaction surface, showed (Table) that the solid phase of the two metals shows no catalytic action, but that the reaction is mainly catalysed by the metal vapor. An addition of water vapor strongly reduces the catalytic action of Zn vapor. Experiments, the results of which are published in the following paper, showed that the catalytic properties of Zn and Cd atoms do not practically change by the action of a carrier, and with partial incorporation into the crystal lattice of a semiconductor. Thus, it is assumed that the metal atom in metallic and semiconductor catalysts has an "autonomous structure" whose catalytic properties are determined by the structure of its own electron shell, and not by the electron properties of the crystalline carrier. There are 5 figures, 1 table, and 6 references: 2 Soviet, 2 British, 1 French, and 1 German. ✓

Card 2/3

83693

Catalysis by Metal Vapors. I. Catalytic
Properties of Zinc- and Cadmium Vapors

S/076/60/034/008/006/014
B015/B054

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova
(Moscow State University imeni M. V. Lomonosov)

SUBMITTED: October 30, 1958

Card 3/3

S/076/60/034/008/039/039/XX
B015/B063

AUTHORS: Pamfilov, A. V., Khomyakov, K. G., Kobozov, N. I.
TITLE: Yevgeniy Ivanovich Shpital'skiy (On the Occasion of the 80th Anniversary of His Birthday)
PERIODICAL: Zhurnal fizicheskoy khimii, 1960, Vol. 34, No. 8, pp. 1887-1889

TEXT: The 80th anniversary of the birthday of the Soviet physicochemist Ye. I. Shpital'skiy was celebrated on October 12, 1959. Shpital'skiy, Professor of Moskovskiy universitet (Moscow University) and Corresponding Member of the Akademiya nauk SSSR (Academy of Sciences USSR), was a student of Professor I. A. Kablukov at the fiziko-matematicheskii fakul'tet Moskovskogo universiteta (Department of Physics and Mathematics of Moscow University) where he acquired the right of holding academical lectures. He left Russia for some time to work in the field of catalysis at several foreign universities. Back to Moscow he was appointed assistant to the kafedra neorganicheskoy khimii (Chair of Inorganic Chemistry) where he held a practical course on physical chemistry. He was then a collaborator

Card 1/2

84243

S/076/60/034/009/001/022
B015/B056

11. 1120

AUTHORS:

Kobzev, N. I., Yerevin, Ye. N., Terekhova, M. G., and
Mai'tsev, A. N.

TITLE:

Physical Chemistry of Concentrated ^AOzone. IX. Study of
Ozone Adsorption on Silica Gel at Various Temperatures

PERIODICAL:

Zhurnal fizicheskoy khimii, 1960, Vol. 34, No. 9, pp. 1893
-1899

TEXT: The adsorption of ozone on silica gel at low temperatures (from -80° to -150°C) was investigated by saturating the silica gel in the gas flow at constant temperature until adsorption equilibrium was established, and the adsorbed gas quantity was then determined by gas analysis. The ozone-oxygen mixture was produced in a silent electrical discharge; the duration of adsorption amounted to 1 - 6 h as a function of the experimental temperature, and the rate of flow of the gas was 43-45 l/h. The experiments were carried out in a circulating apparatus (Fig. 1). The silica gel was in an adsorber cooled with liquid nitrogen (Figs. 2, 4). The latter was cooled in a cryostat (Fig. 3), whereas for

Card 1/2

86778

S/076/60/034/011/002/024
B004/B064

5.1190

2209, 1203, 1297

AUTHORS:

Krylova, I. V., Ogarev, V. A., and Kobozov, K. I. (Moscow)

TITLE:

The Effect of the Electronic Properties of the Carrier on the Photosensitivity of Platinum Catalysts

PERIODICAL:

Zhurnal fizicheskoy khimii, 1960, Vol. 34, No. 11, pp. 2408 - 2413

TEXT: In contrast to the negative results of other researchers, the authors succeeded in proving that preceding exposure to light of metal catalysts, i.e., of platinum on silica gel or platinum black, reduces their activity (Ref. 4). The present paper deals with the photo-effects of a platinum catalyst applied to various carriers. Boneblack, germanium, and bismuth were such catalysts. Their activity was determined by measuring the decomposition rate of H_2O_2 . The light source was a WPK-2 (PRK-2) lamp.

A comparison of the results obtained for Pt on silica gel and platinum black with those of Ref. 4 led to the following conclusions: The decrease in the catalytic activity of platinum during exposure to light is assumed

Card 1/2

23009

S/189/61/000/004/002/002
D051/D112

11.8300
11.1125

AUTHORS: Strakhov, B.V., Lebedev, V.P., Kobozev, N.I.

TITLE: Transition of the detonation of a gaseous ozone-oxygen mixture into a liquid ozone-oxygen solution

PERIODICAL: Moskva, Universitet. Vestnik. Seriya II Khimiya, no. 4, 1961, 31-32

TEXT: The present study is concerned with the explosive properties of the system liquid ozone-oxygen solution - gaseous ozone-oxygen mixture. It continues investigations of N.I. Kobozev, V.V. Yastrebov, and Ye.N. Pitskheluri (Ref. 1: Zhurn. fiz. khimii, 33, 649, 1959; Ref. 2: Zhurn. fiz. khimii, 33, 1209, 1959), which showed that the explosive sensitivity of ozone-oxygen solutions abruptly diminishes with increasing oxygen concentration. In a special cylinder, which permitted separate preparation of liquid and gas of various concentrations, the authors studied the explosiveness of the liquid ozone-oxygen solutions depending on composition and pressure, from 150 to 500 mm mercury column, of the gaseous ozone-oxygen mixtures, which were in contact with the liquid. The experimental results are given in the figure.

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23009

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D051/D112

Transition of the detonation ...

The curves represent the boundaries of explosiveness for the indicated pressures of the gas phase. It can be seen that growing pressure shifts the boundary of transition of the detonation from gas to liquid towards lower ozone concentrations in the gas, whereas lower ozone concentrations in the liquid shift this boundary towards higher ozone concentrations in the gas. The shaded section of the figure represents the zone of safety, whose points correspond to concentrations of ozone in the gas and liquid phase below 50 and 25%, respectively, where detonations of the gas are not transmitted to the liquid. This zone holds for pressures of the gas phase not above 500 mm mercury column. There are 1 figure and 2 Soviet references. X

ASSOCIATION: Kafedra fizicheskoy khimii (Department of Physical Chemistry)

SUBMITTED: July 9, 1960

Card 2/3

30342

S/189/61/000/006/004/005
D228/D304

11.11.20
AUTHORS:

Yemel'yanova, G.I., Lebedev, V.P. and Kobozev, M.I.

TITLE:

Catalytic decomposition of liquid ozone at low temperatures. II The energy of activation of the low-temperature decomposition of ozone and the activity of palladium black

PERIODICAL:

Moscow. Universitet. Vestnik. Seriya II, khimiya, no. 6, 1961, 31-34

TEXT: This investigation of the low-temperature decomposition of ozone and the activity of Pd black is a continuation of previous research by the authors (Ref. 1: Vestn. Mosk. un-ta, ser. khimii, no. 6, 7, 1960) in which a catalytic process was discovered for the decomposition of liquid ozone on Pt black at -195.6° . Their new data, obtained from the decomposition of ozone on Pt black at -183° and -195.6° , show that the mean

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S/189/61/000/006/004/005
D228/D304

Catalytic decomposition ...

apparent energy of activation of the process is 500 cal. mol.⁻¹. Pd black was found to be equally effective; the data for this catalyst satisfy the kinetic equation previously deduced for Pt black, and the maximum number of molecules decomposed in one second by one atom of catalyst was calculated as 1.2×10^{-2} - an unexpectedly high value for low-temperature catalytic processes. However, Ag black, CuO, Cu, NiO, Ni₂O₃, Fe₂O₃, and

Fe are catalytically quite inactive. It was also established from other tests that the rate of catalysis for Pd and Pt black is in no way influenced by diluting the ozone with oxygen or nitrogen. Moreover, the experimental study of the relationship of the catalyst's activity to its quantity - at a constant concentration of ozone - indicates a certain decline in the relative activity of Pt black when its concentration exceeds 30 mg. The authors hence conclude that the decomposition of liquid ozone on Pd and Pt black is undoubtedly a heterogeno-

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D228/D304

Catalytic decomposition ...

catalytic process. However, further work will be undertaken to ascertain whether the transmission of the energy of the simple exothermic act of dissociation to the reacting molecules is accomplished through the catalysts crystal-lattice or in the adsorbed layer of ozone. There are 4 figures, 1 table, and 2 references: 1 Soviet-bloc and 1 non-Soviet-bloc. ✓

ASSOCIATION: Kafedra fizicheskoy khimii (Department of Physical Chemistry)

SUBMITTED: August 3, 1960

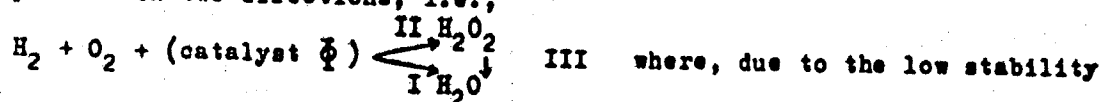
Card 3/3

S/076/61/035/002/005/015
B124/B202

AUTHORS: Pospelova, T. A., Kobozev, N. I., and Yeregin, Ye. N.
TITLE: Catalytic synthesis of hydrogen peroxide from its elements on palladium. I. Conditions for the production of hydrogen peroxide.

PERIODICAL: Zhurnal fizicheskoy khimii, v. 35, no. 2, 1961, 298-305

TEXT: A comparison of the free formation energies of water and hydrogen peroxide from their elements (-56.56 kcal for liquid water, and -28.25 kcal for liquid H_2O_2) shows that on catalysis the H_2-O_2 reaction may proceed in two directions, i.e.,



of the H_2O_2 molecules in the presence of the catalyst H_2O_2 and water are decomposed thus causing the masking of the second process. For this reason the authors studied the optimum conditions for the synthesis of

Card 1/9

Catalytic synthesis of hydrogen peroxide...

S/076/61/035/002/005/015
B124/B202

H_2O_2 from the elements on palladium on the one hand and its decomposition at the same catalysts on the other. The detonating gas was catalyzed in a kinetic vessel of Shpital'skiy type. The time dependence of the H_2O_2 yield was studied on palladium black in a mixture of KCN (0.001 N) and sulfuric acid (0.1 N) as well as on aluminum gel ($\%Pd = 5.47$). The gas mixture consisted of 20% hydrogen and air; the activity of the catalyst was measured from the absorption of 2 cm³ of the mixture. The experimental results are given in Fig. 1. They indicate that in both cases (mainly in Pd/Al₂O₃) the H_2O_2 yield is strongly reduced with time although the absorption of the mixture continues (ΔV increases). In this case, the initial yield exceeds 80% on Pd black, i.e., almost pure H_2O_2 is formed. Hence H_2O_2 is formed as primary product of the catalysis of detonating gas. Its catalytic decomposition causes the formation of water. The authors studied the effect of a number of acids, mixtures of KCN with different acids, ammonia and Hg^{2+} solutions in H_2SO_4 (Table 1). Without introduction of catalyst poisons only water is formed. The most efficient inhibitor of H_2O decomposition is plumbic acid, followed by dilute HCl; the effect of the other acids is weaker while NH_3 and Hg^{2+} solutions

Card 2/4

Catalytic synthesis of hydrogen peroxide...

S/076/61/035/002/005/015
B124/B202

inhibit both, formation and decomposition of H_2O_2 . In this case, the acids do not enter an irreversible reaction and their decrease in quantity in the reaction is caused by absorption on the catalyst (Table 2). It was found that a) the stabilizing effect of HCN (Fig. 3) and HCl (Fig. 4) is especially marked at low concentrations and that it passes through an optimum; b) the optimum synthesis of H_2O_2 is achieved at a stoichiometric ratio of $H_2O_2 = 1$, c) the H_2O_2 yield increases with increasing temperature (Table 4), and d) the acid carriers SiO_2 and WO_3 give higher H_2O_2 yields than the amphoteric Al_2O_3 (Table 5). The following scientists are mentioned: N. I. Kobozov and V. L. Anokhin (Ref. 3: Z. phys. Chem., Abt. B, 13, No. 1-2, 1931), M. V. Polyakov and collaborators (Ref. 4: Zh. fiz. khimii, 7, 453, 1933; 8, 954, 1934; 6, 1241, 1249, 1932; Acta phys.-chim. URSS, 2, 211, 1935), N. D. Zelinskiy and M. B. Turova (Ref. 6: Ber. 18, 1884, 1885), P. M. Stadnik (Ref. 9: Dokl. AN SSSR, 87, 1952; Zh. fiz. khimii, 28, 1954), N. A. Bakh (Ref. 11: Trudy Bakha, no. 1, Abt. 2, Kap. 1, 1937), S. Levina and R. Rosentreter (Ref. 13: Zh. fiz. khimii, 13, 1939), A. I. Shlygin (Ref. 14: Uche. zap. Kazakhsk. un-ta, 13, 1951), D. V. Sokol'skiy and collaborators (Ref. 15:

Card 3/6

Catalytic synthesis of hydrogen peroxide...

S/076/61/035/002/005/015
B124/B202

Dokl. AN SSSR, 113, 1957; 493; 1954). There are 5 figures, 5 tables, and 17 references: 7 Soviet-bloc and 10 non-Soviet-bloc. 1 reference to English-language publications reads as follows: E. B. Maxted, L. K. Moon, E. Overgate, Disc. Faraday Soc., 8, 135, 1950).

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

SUBMITTED: May 14, 1959

Card 4/4

S/076/61/035/003/005/023
B121/B203

11.1190

AUTHORS: Pospelova, T. A. and Kobozev, N. I.

TITLE: Catalytic synthesis of hydrogen peroxide from elements on palladium. II. Active centers of palladium in H_2O_2 synthesis

PERIODICAL: Zhurnal fizicheskoy khimii, v. 35, no. 3, 1961, 535-542

TEXT: The authors studied the active centers of the catalyst in H_2O_2 synthesis. They discussed the mechanism of catalysis in the formation of H_2O_2 and water from detonating gas on palladium and platinum catalysts. The catalysts were prepared by a method described earlier by the authors together with Ye. N. Yeregin (Ref. 1: Zh. fiz. khimii, 35, 298, 1961). The effect of an inert carrier (silica gel) on the reaction rate and on the H_2O_2 yield was investigated. Volume processes were found to play no important role in the H_2O_2 formation. When studying the structure of active centers of Pd in catalytic H_2O_2 synthesis, a palladium doublet (Pd_2) was

X

Card 1/4

Catalytic synthesis ...

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B121/B203

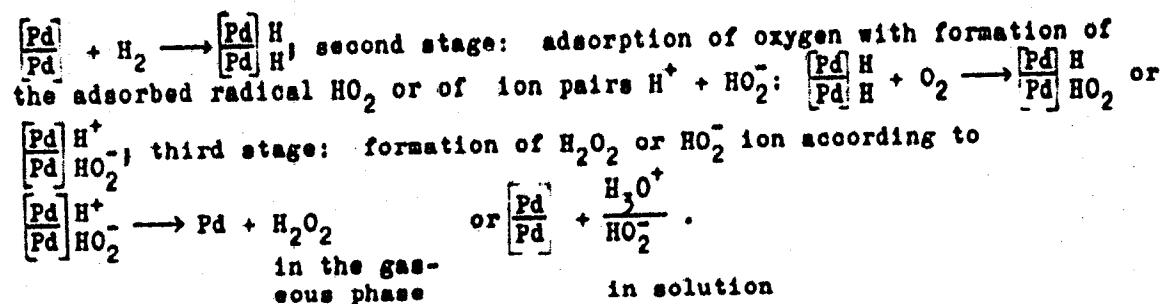
4

found to be active. When comparing the activities of Pd black and of the adsorption catalyst Pd/SiO₂ (containing the same Pd amount), the formation rate of H₂O₂ was found to be 15 times higher on the adsorption catalyst than on Pd black. The catalytic activities of platinum and palladium in H₂O₂ synthesis were compared; the mechanism of catalysis on Pt and Pd catalysts was found to be different. Hydrogen peroxide occurs as a primary product on active Pd₂ centers, whereas water occurs on the atomic active centers of platinum. The active Pt centers were studied in papers by one of the authors (Ref. 6: Zh. fiz. khimii, 13, 1939; 14, 663, 1940) and by N. A. Reshetovskaya (Ref. 5: Dissertatsiya, MOU, 1947). The higher affinity of Pd to hydrogen is the cause of the catalytic formation of hydrogen peroxide on the Pd catalyst. The following mechanism was found for the catalysis of detonating gas on the Pd catalyst: first stage: adsorption of hydrogen to the active Pd₂ centers, and dissociation into atoms according to:

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B121/B203

Catalytic synthesis ...



The mechanisms of the catalytic reaction of detonating gas on Pt and Pd catalysts differ in the cleavage of the bond of the oxygen molecule. On the Pd catalyst, the oxygen chain -O-O- is maintained and, thus, the formation of H_2O_2 made possible, whereas on platinum both oxygen-molecule bonds are cleft.

There are 4 figures, 4 tables, and 14 references: 7 Soviet-bloc and 7 non-Soviet-bloc. The reference to the English-language publication reads as follows: R. P. Donnelly, C. N. Hinschelwood, J. Chem. Soc., 131, 1727, 1929.

Card 3/4

Catalytic synthesis ...

S/076/61/035/003/005/023
B121/B203

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova
(Moscow State University imeni M. V. Lomonosov)

SUBMITTED: June 4, 1959

X

Card 4/4

KOBOZEV, N.I., YEVDOKIMOV, V.B.

A few comments on the paper by W. Trzebiatowski and H. Kubicka,
Zhur. fiz. khim. 35 no.3:684-686 Mr '61. (MIRA 14:3)

1. Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova.
(Magnetism) (Platinum) (Palladium)

11.2140

S/076/61/035/003/022/023
B121/206

AUTHORS: Nekrasov, L. I., Skorokhodov, I. I., and Kobozev, N. I.

TITLE: The nature of the peroxide-radical condensates (Answer to P. A. Giguere and D. Chin)

PERIODICAL: Zhurnal fizicheskoy khimii, v. 35, no. 3, 1961, 691-693

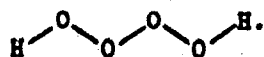
TEXT: P. A. Giguere and D. Chin (Ref. 1: J. Chem. Phys., 31, 1685, 1959) doubt that a higher hydrogen peroxide H_2O_4 is formed during peroxide-radical condensation. This assumption is, however, confirmed by various physico-chemical and analytical methods (thermographic, calorimetric, and magnetic investigations). Especially by magnetic investigations it is shown that the peroxide-radical condensate is slightly diamagnetic at temperatures below $-110^{\circ}C$, and that at temperatures above $-110^{\circ}C$ the total magnetic susceptibility increases along with a simultaneous increase of the paramagnetic properties. The increase of the total magnetic susceptibility shows that the liberated oxygen is to be regarded as a decomposition product of the unstable chemical composition H_2O_4 . The process in question is therefore not a simple

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The nature of ...

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B121/B206

desorption of occluded oxygen. The following chain structure has been assigned to the compound H_2O_4 :



The failure of P. A. Giguere to obtain H_2O_4 is explained by the application of solid ozone instead of liquid one. The decomposition of the compound H_2O_4 at a temperature increase proceeds according to the reaction $H_2O_4 \rightarrow H_2O_2 + O_2$. The mechanism of the reaction of the H atoms with the liquid ozone film is discussed. The radical HO_2 formed on the surface of the liquid ozone according to the reaction $O_3 \text{ (liquid)} + H \rightarrow HO_2 + O \text{ (1)}$ diffuses into the ozone film where the reaction $HO_2 + HO_2 \rightarrow H_2O_4 \text{ (4)}$ takes place. There are 14 references: 8 Soviet-bloc and 6 non-Soviet-bloc. The four most recent references to English-language publications read as follows: P. A. Giguere, D. Chin, J. Chem. Phys., 31, 1685, 1959; R. A. Jones, C. A.

Card 2/3

The nature of ...

S/076/61/035/003/022/023
B121/B206

Winkler, Canad. J. Chem., 29, 1010, 1951; J. S. Batzold, C. Luner, C. A.
Winkler, Canad. J. Chem., 31, 262, 1953; J. D. Mo Kinley, D. Garvin, J. Amer.
Chem. Soc., 77, 5802, 1955.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova
(Moscow State University imeni M. V. Lomonosov)

SUBMITTED: September 15, 1960

Card 3/3

22005

S/076/61/035/004/013/018
B106/B201

11.1310 also 2114

AUTHORS: Skorekhodov, I. I., Nekrasov, L. I., Kobozov, N. I.,
and Makarova, Ye. I.

TITLE: Problem of a higher hydrogen peroxide and frozen radicals

PERIODICAL: Zhurnal fizicheskoy khimii, v. 35, no. 4, 1961, 905 - 910

TEXT: III. Kinetics of the decomposition of peroxide radical condensate
formed from dissociated water vapors

By peroxide radical condensates the authors designate the products formed by freezing out water- and hydrogen peroxide vapors after dissociation in an electric discharge, and also by the reaction of atomic hydrogen with oxygen or liquid ozone at very low temperatures. Data available in the literature concerning the kinetics of decomposition of these peroxide radical condensates with temperature rise contradict one another as to important items (Ref. 6: E. Ohara, J. Chem. Soc. Japan, 61, 569, 1940; Ref. 7: L. I. Nekrasov, Dis. MGU, 1951; Ref. 8: R. A. Jones, C. A. Winkler, Canad. J. Chem., 29, 1010, 1951). For this reason, the authors

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22005

S/076/61/035/004/013/018
B106/B201

Problem of a higher hydrogen ...

studied the decomposition kinetics of such condensates, which were prepared in an apparatus described earlier (Ref. 5: Zh. fiz. khimii, 31, 1843, 1957; Ref. 11: Zh. fiz. khimii, 32, 87, 1958). The water vapor entered the discharge tube at a rate of 1.4 g/hour and a pressure of 0.5 mm Hg. The discharge amperage was 0.2 a, the voltage 1000-1200 v. The cooling trap was cooled with liquid nitrogen. 0.7-0.8 g were the initial amounts of condensate in all experiments. The condensate composition was the same in all experiments; the molar ratio between oxygen generating from decomposition and remaining hydrogen peroxide was always 0.15, the concentration of H_2O_2 in the final solution was 50 percents by weight.

The decomposition of the condensates was studied in an experimental system that had been likewise described earlier. The decomposition of the peroxide radical condensates with slow heating was found to take place essentially in two stages with different temperature coefficients and different activation energies. The first noticeable separation of oxygen takes place between -95 and -70°C for about 17% of the total oxygen formed. The solid condensate starts melting at -70°C; this process comes to an end at -60°C. In this temperature range, and also on a further heating,

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B106/B201

Problem of a higher hydrogen ...

the second more intensive stage of decomposition takes place, at which the chief oxygen amount escapes. The decomposition is completed at -40 to -30°C. Between -110 and -100°C a hardly noticeable step appears in the curve of gas separation, which characterizes a weak decomposition process in which about 3% of the total oxygen is generated. This weak decomposition is accompanied by the disappearance of the yellowish color and by a modification of the condensate structure: the condensate becomes opaque and begins to melt in places. An analysis of the kinetic curve, taken under isothermal conditions, showed the two-stage decomposition reaction in the temperature range -95 to -40°C to be a reaction of first order. The activation energy amounts to 1.2-1.4 kcal for the first stage of decomposition (with condensate in the solid state), but 8.0-9.0 kcal for the second stage of decomposition. The results substantiate the earlier assumption of the higher hydrogen peroxide H_2O_4 being contained in the condensate. The authors reach the conclusion that the assumption put forth by E. Ohara some time ago (Ref. 6) is still the most probable explanation accounting for the results obtained. According to this assumption, the two-stage aspect of the decomposition of the peroxide radical

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